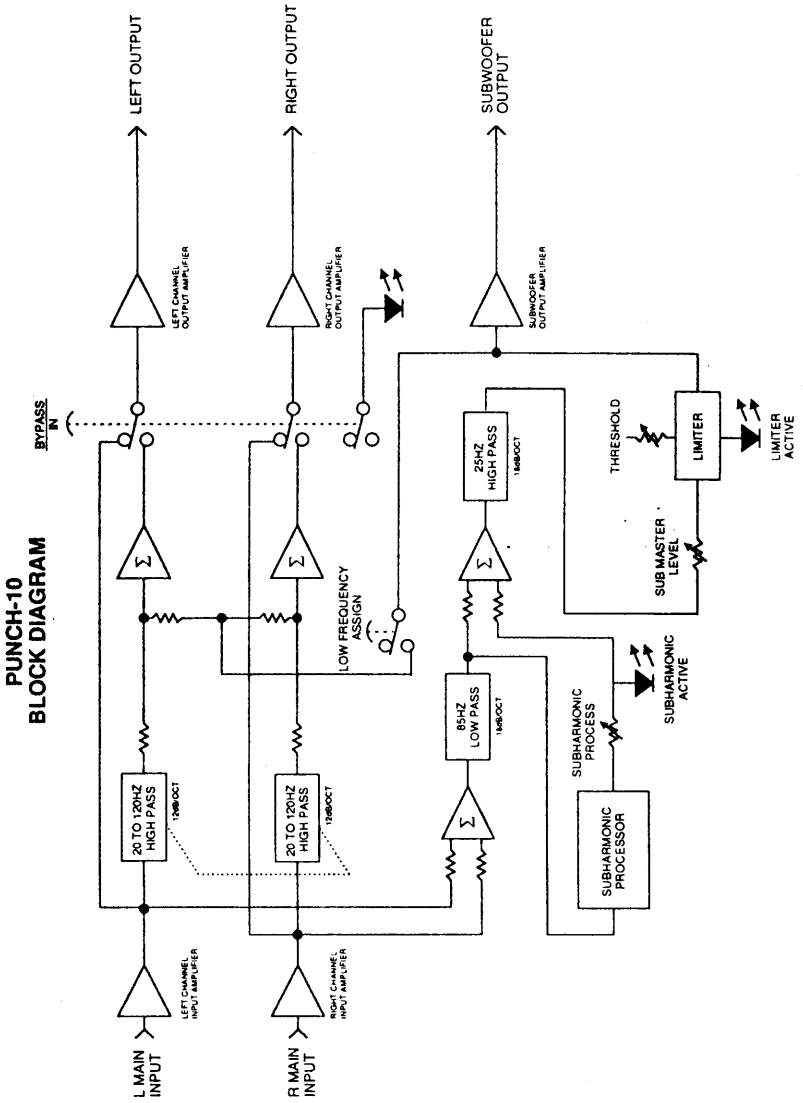
PUNCH-10
BLOCK DIAGRAM



FURMAN

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FURMAN

Bass Enhancement System

MODEL PUNCH-10

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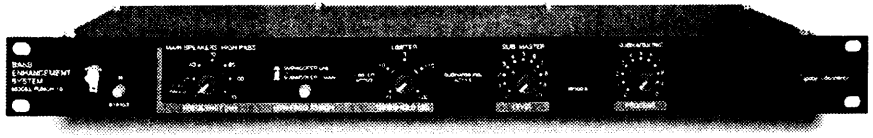

Owner's Manual

Important Note: To obtain best results from this Furman Sound electronic product, please be sure to read this manual carefully before using it. Also, to be sure of obtaining full protection under the terms of the Limited Warranty in case your ownership documents are lost, please fill out and return the Warranty Registration Card immediately. Please verify that the serial number shown on the Warranty Card matches the serial number on your unit.

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Introduction

Congratulations on your purchase of a Furman Sound Model PUNCH-10 Bass Enhancement System. You have chosen a signal processor with outstanding features and performance specifications, and great versatility in presenting and creatively enhancing all kinds of recorded musical and vocal program material. The PUNCH-10 is currently in use by professional disc jockeys operating both mobile and fixed installations where dance music is played. The PUNCH-10 is also a proven performer in aerobics classes, broadcasting, theater, audio production for video and film, mixed media events and live sound.

Features

- Creates bass content an octave below the existing fundamental
- Subharmonic Active LED
- Hard limiter with adjustable threshold
- Limiter Active LED
- High pass filter on main speakers (no separate crossover needed to add a subwoofer)
- Bypass button with LED
- Low Frequency Assign button routes synthesized bass to main speakers or subwoofer
- Control to adjust the amount of subharmonics generated
- Control to adjust volume for PUNCH-10 outputs
- Main inputs and outputs are stereo; subwoofer output is mono
- Ground Lift and on/off switches on rear panel
- Optional balanced configuration (model PUNCH-10B) has balanced inputs and outputs using XLR connectors

Brief Description

The **PUNCH-10™ Bass Enhancement System** is the ultimate signal processor for augmenting the bass content of recorded music. It was designed specifically for use in nightclubs and discothèques, but will also find applications ranging from theater to film sound to live music performance. The PUNCH-10 is no mere equalizer. Equalization alone is insufficient to deliver real punch to a dance beat, because trying to boost bass that isn't there will only boost the background noise and hum. The PUNCH-10 is a proprietary true subharmonic processor — it actually synthesizes bass where none existed before, by generating a signal component an octave *below* the existing fundamental (lowest frequency present). The result is bass that can be felt as well as heard, bass that will maximize the sense of realism and increase audience involvement.

Whenever the PUNCH-10 is generating subharmonics, a Subharmonic Active LED is lit. A SUBHARMONIC PROCESS control determines how much synthesized bass is created; a SUB MASTER LEVEL control adjusts the amount of synthesized bass that is available to augment the original stereo program.

The PUNCH-10's output is ideally suited to amplification through a stereo system incorporating a separate subwoofer, yet it can enhance more basic systems as well. A Low Frequency Assign button routes the bass content either to the Subwoofer output only, or to both the Subwoofer output plus the main stereo outputs. If no subwoofer is present, the latter position allows the enhanced bass to be heard through the available speakers. The Subwoofer output contains frequencies of 85 Hz and below; higher frequencies are rolled off at 18 dB per octave. The bandwidth appearing at the main outputs is set with the Main Speakers High Pass control, adjustable from 15 to 135 Hz and rolling off at 12 dB per octave.

Because the extreme excursions attributable to high level subharmonics carries a potential for causing speaker damage, the PUNCH-10 includes a hard limiter acting on the processed subharmonic signal, with a Threshold adjustable from -20 to +20 dBu. A Limiter Active LED indicates when the limiter circuit is reducing gain.

The PUNCH-10 includes a Bypass button with an LED indicator; a Ground Lift switch and On/Off switch are located on the rear panel.

Installing the PUNCH-10

There are two basic modes of using a PUNCH-10: with and without a subwoofer. (A "subwoofer" is a special speaker optimized for reproducing the lowest bass notes. A subwoofer system includes a subwoofer speaker and its cabinet or enclosure, and a power amplifier to drive it.) If your system does not now include a subwoofer, you can use the PUNCH-10 to add the subharmonics it creates to your main stereo speakers. Later, if you add a subwoofer, you need only make some simple changes to your setup to accommodate it. You will not need a separate crossover for the subwoofer — the PUNCH-10 itself provides all the necessary frequency division. Refer to the "PUNCH-10 Hookup" diagram on page 5.

Without a Subwoofer: The PUNCH-10 should be connected between the main outputs of your mixer and the crossover for your main speaker system (if used; if no crossover, then the power amp.) The PUNCH-10's SUBWOOFER OUT is not used.

The LOW FREQUENCY ASSIGN button on the front panel must be in the SUBWOOFER + MAIN position. Set the MAIN SPEAKERS HIGH PASS control to the lowest frequency that your stereo speakers are capable of reproducing. If you are not sure what frequency that is, check the speaker specifications or ask your speaker dealer for advice. Use the FULL RANGE position only if you are sure the speakers can respond to frequencies as low as 25 Hz (most speakers cannot go this low). *Do not set this control lower than is appropriate for your speakers.* Doing so will not increase the bass you hear and will greatly increase the likelihood of speaker damage.

With a Subwoofer: The PUNCH-10 should be connected between the main outputs of your mixer and the crossover for your main speaker system (if used; if no crossover, then the power amp). The SUBWOOFER OUT should be connected to a power amp for the subwoofer. Since extreme low frequencies do not carry much directional information, the subwoofer out is mono (a mix of left plus right), not stereo. Therefore the subwoofer power amp should be operated in

mono mode if possible; if there is no mono mode, only one channel should be used. The subwoofer speaker itself should be installed in a central location so it is equally loud in all areas.

The LOW FREQUENCY ASSIGN button on the front panel should be in the SUBWOOFER ONLY position. Set the MAIN SPEAKERS HIGH PASS control no lower than the lowest frequency your stereo speakers are capable of reproducing. The recommended setting is 70 to 85 Hz. The SUBWOOFER OUTPUT contains frequencies of 85 Hz and below.

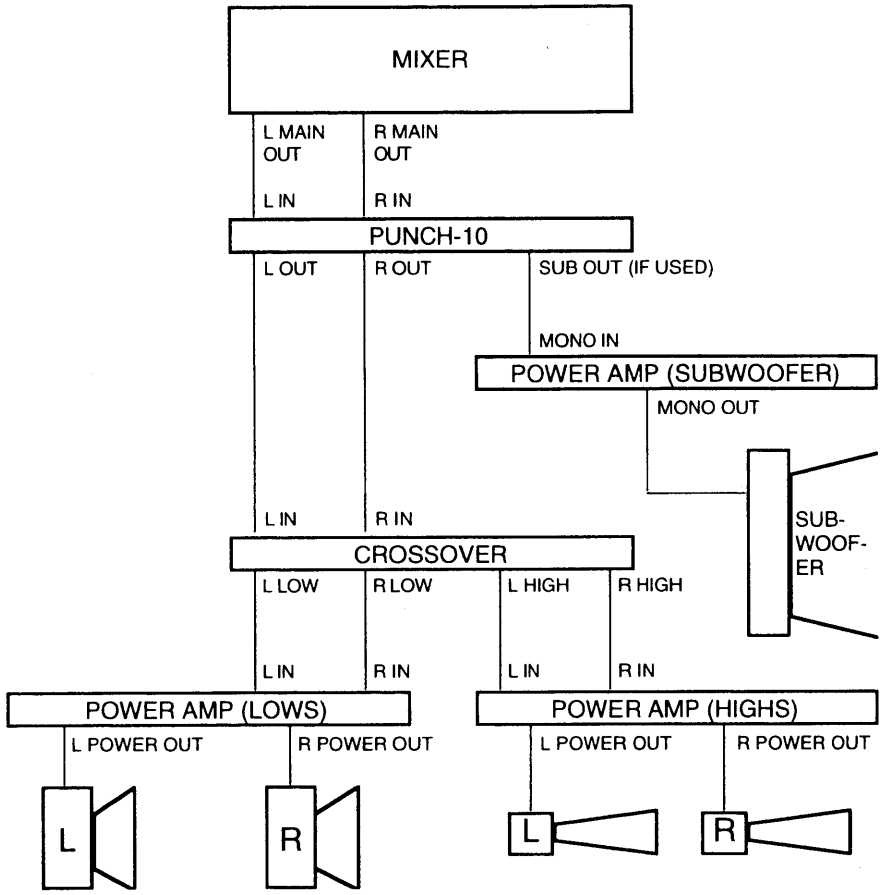
Rack Mounting: The PUNCH-10 is intended for mounting in standard 19" equipment racks. Standard racks come equipped with mounting rails with holes tapped for 10-32 machine screws. Be sure to use only 10-32 screws (in particular, avoid 10-24 screws, which will fit if forced but will strip the threads).

Certain DJ "coffins" (consoles with turntables or CD players at left and right, and space for a mixer in the center) and other custom installations do not have tapped holes for installing rack-mount accessories. In this case, wood screws must be used. Regardless of the type of screws used, avoid marring the front panel when tightening the screws by using nylon washers under the screw heads.

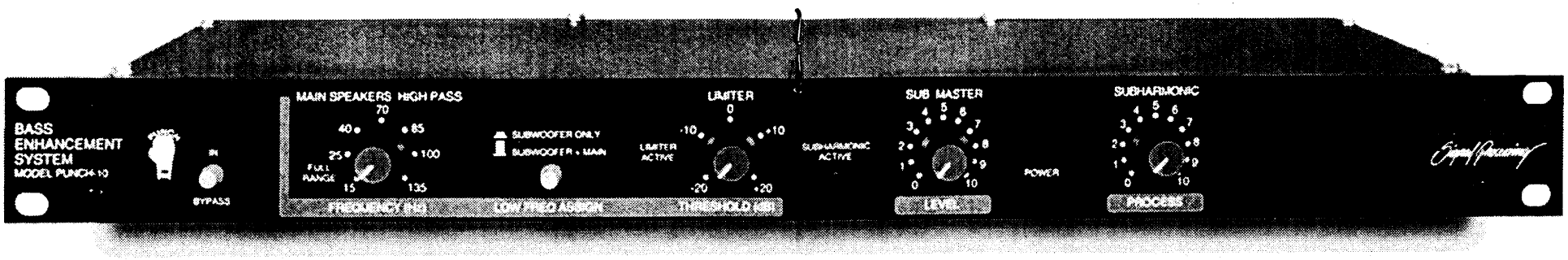
Cables: For best results, all cables plugged into any audio equipment should be shielded. Balanced connections should use shielded, twisted-pair cable. Make sure each cable fits snugly and is not stretched so tightly that it may come unplugged if the equipment is moved a small distance. (If you have a balanced version (Model PUNCH-10B) also see "Balanced Option" in the next section of this manual.)

Hum Problems and the Ground Lift Switch: In many installations, hum-causing ground loops are formed by the common connection of various pieces of equipment to the power line ground, and by contact between chassis, as in a rack with metal rails. Sliding the Ground Lift switch to the LIFT position completely isolates all signal grounds from the chassis, breaking most ground loops. The chassis always remains connected to the ground pin on the AC cord for safety and to provide shielding against RF interference. Try both positions of the Ground Lift switch, and leave the switch in the position that results in the least hum in your system. *Note:* The ground lift can be rendered ineffective by 3 pin XLR-type connectors that tie pin 1 (signal ground) to the metal shell of the connector (chassis ground). The connection from pin 1 to the shell is optional on all 3 pin audio connectors, and can be removed if present, by opening up the connector on the cable and disconnecting it.

PUNCH-10 HOOKUP DIAGRAM



Summary of Controls and Connections



Front Panel

BYPASS SWITCH: This button must be in (LED on) for the PUNCH-10 to create subharmonics. When in BYPASS mode (button out), a full-range signal reaches the main outputs and there is no signal at the subwoofer output.

MAIN SPEAKERS HIGH PASS FREQUENCY: Adjusts the cutoff frequency of a high-pass filter on the main stereo outputs, rolling off at 12 dB per octave.

LOW FREQUENCY ASSIGN BUTTON: This button determines whether the created subharmonics go only to the subwoofer output (SUBWOOFER ONLY position, for use *with* a subwoofer system), or are also added into the main stereo outputs (SUBWOOFER + MAIN position, for use *without* a subwoofer system).

LIMITER ACTIVE LIGHT: When the limiter is in use and the signal level exceeds the selected threshold, this LED glows red to indicate gain reduction is taking place. If it is on more than occasionally, you may want to reduce the SUB MASTER LEVEL control somewhat so that it doesn't flash so often.

LIMITER THRESHOLD: The purpose of the PUNCH-10's limiter is to protect speaker systems from damage that might be caused by excessive bass power. Subwoofers are generally adequately equipped to handle high bass power levels; full range stereo speakers are often less so, so the limiter is particularly important if you do *not* have a subwoofer system. The LIMITER THRESHOLD knob indicates the level at which limiting will occur, adjustable over a 40 dB range. The fully clockwise position, +20, coincides with the PUNCH-10's maximum output, so this setting is equivalent to no limiting. Any lower setting results in automatic gain reduction, limiting the maximum output level beginning at the selected threshold level.

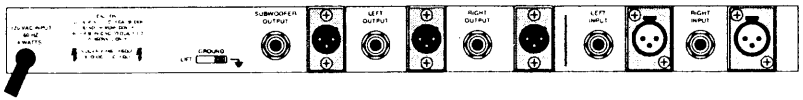
SUBHARMONIC ACTIVE LED: Glows green to indicate subharmonics are being created and added to the program.

SUB MASTER LEVEL: This knob is simply a volume control for the subwoofer output. It does not affect the blend of original vs. synthesized bass, just the loudness of that blend. If you are not using a subwoofer (i.e., the LOW FREQUENCY ASSIGN button is set to SUBWOOFER + MAIN so that you get the bass blend mixed back into the main stereo outputs), it controls how much of that blend is added back into the stereo outs. Thus, if the SUB MASTER LEVEL is turned down all the way, you will have no bass at all at the subwoofer output, and only the original unprocessed bass present in the main stereo outputs.

SUBHARMONIC PROCESS: This knob adjusts the amount of subharmonics generated. Turning it up results in more subharmonics being created, which you can see because the SUBHARMONIC ACTIVE light flashes more. The bass output of the PUNCH-10 is actually a blend of the original bass that was present in the first place, plus the synthesized bass. If the SUBHARMONIC PROCESS knob is turned down all the way, you will still have bass, but it will only be the amount that was present in the input signal. As you turn it up, you mix in more and more of the synthesized bass.

To sum up, the SUBHARMONIC PROCESS control should be set to give the desired proportion of synthesized subharmonic bass to original bass. The SUB MASTER LEVEL provides a convenient way of adjusting the loudness of the subwoofer. As such, it may duplicate the function of the volume control on the subwoofer power amp (if there is one), but it will usually be in a more accessible location. When there is no subwoofer in use, the SUB MASTER LEVEL serves as an overall loudness control for the bass portion of the full-range stereo program

Rear Panel



ON-OFF SWITCH: When on, this switch lights brightly to show that power is applied.

GROUND LIFT SWITCH: In the LIFT position, this switch completely isolates all signal grounds from the chassis, breaking most hum-causing ground loops. In the position marked by the ground symbol, the signal ground is connected to the chassis. In either case, the chassis remains connected to the ground pin on the AC cord for safety and to provide shielding against RF interference.

SUBWOOFER OUTPUT: An output containing original and synthesized low frequencies only, for driving a subwoofer amplifier. The SUBWOOFER OUTPUT is mono (a mix of left plus right) because very little directional information is contained in the low bass portion of stereo music. (Nevertheless, the subwoofer speaker itself should be installed in a central location so it is equally loud in all areas.) The Subwoofer Out is composed of a limited band of frequencies from 25 Hz to 85 Hz. Above and below those points, it is rolled off at 18 dB per octave.

LEFT AND RIGHT OUTPUTS: The PUNCH-10's main stereo outputs, intended to drive the crossover (if used) or power amplifiers for the main stereo speakers. Synthesized bass may or may not be present at these outputs depending on the setting of the LOW FREQUENCY ASSIGN button.

LEFT AND RIGHT INPUTS: The PUNCH-10's stereo inputs are designed to process high level audio signals in the -10 to +4 dBu range — the levels ordinarily put out by audio sources like tape decks, CD players, FM tuners, etc. (though not phono turntables). These inputs should be connected to the main outputs of your mixer or other line level program source.

BALANCED OPTION: If you have model PUNCH-10B, XLR connectors will be present for the Left and Right inputs, the Left and Right outputs, and the Subwoofer output (as well as the equivalent 1/4" phone unbalanced inputs and outputs). Either the balanced or unbalanced connectors may be used. Balanced lines offer the benefits of cancellation of hum, noise, and RF interference which may be picked up in the interconnecting cables. For balanced connections, shielded twisted pair cable must be used. The wiring is as follows: Pin 1—shield; Pin 2—signal positive; and Pin 3—signal negative. If desired, the XLR (balanced) and phone (unbalanced) outputs may all be used simultaneously. However, either the balanced or the unbalanced inputs should be used, but not both together.Caution: Do not connect an unbalanced line to the Balanced Output connector. If an unbalanced line is used in the output circuit, connect it to the phone jack output only. Use of XLR-to-phone adaptors is not recommended.

Operation

The PUNCH-10 Bass Enhancement System is much more than a tone control for low bass. Because recorded music must satisfy the dynamic range and frequency response limitations imposed by recording tape, vinyl records, AM and FM broadcasting, small car speakers, etc., it may not have the ideal bass content for that very special environment, the dance club. Dance clubs with their preference for thundering bass that can be *felt* as well as heard are often better equipped to handle the lowest bass notes than are most other audio environments. Typically, dance clubs employ specially designed subwoofers and have plenty of amplification power available to drive them.

When you operate the PUNCH-10, you will use it to create additional bass by electronically deriving a *subharmonic* of the existing fundamental (lowest) tones — those found at 100 Hz or below. (The subharmonic is half the existing fundamental frequency. Another way of saying this is that the subharmonic is one octave lower than the fundamental.) Here's how to set up your PUNCH-10:

SUBHARMONIC PROCESS Control: Use this control to adjust the amount of the created bass that is heard. This control is off when it is turned fully counterclockwise — no subharmonics are being created. Turning it up (clockwise) increases the subharmonic content. A SUBHARMONIC ACTIVE light glows green whenever subharmonics are being created and added to the program. Note that the SUBHARMONIC PROCESS control's effect may be less apparent in a system that does not have subwoofers, because of the limited ability of conventional speakers to reproduce the very lowest lows. To make a quick comparison of the effect with and without the subharmonics, you can pop the BYPASS button in and out. The PUNCH-10's bass enhancement effect is present only when the LED above the BYPASS button is lit.

CAUTION! Use the SUBHARMONIC PROCESS control sparingly. Extremely low bass notes are difficult for speakers to reproduce unless they have been specifically designed for that purpose. Most subwoofers use 15" to 18" drivers. Other types of speakers may be damaged by excessive bass. The PUNCH-10's limiter will help you control excessive bass, especially important when you don't have a subwoofer.

SUB MASTER LEVEL Control: Use the SUBHARMONIC PROCESS Control described above to create additional bass. Use this knob as a volume control for the amount of synthesized bass that is being sent to the PUNCH-10's outputs.

LIMITER THRESHOLD Control: Using the limiter will allow you to run your system louder and cleaner while giving protection to your speakers and drivers from the most extreme peaks. The limiter circuit in the PUNCH-10 is designed to provide an extra degree of speaker protection which otherwise would have required the use of a separate, external limiter. The PUNCH-10's built-in limiter controls both momentary peaks which might cause distortion, and sustained peaks which could actually damage a speaker. Because of the high energy content of extremely low bass peaks, this is a very real hazard. The limiter works by rapidly reducing gain whenever the level exceeds that set with the LIMITER THRESHOLD control. It does this without causing distortion. The limiter has no

effect on program levels below the threshold. The LIMITER ACTIVE light glows red when gain is being reduced.

The PUNCH-10's limiter is an aid to speaker protection, but it can only do so much. Even if it is used, there are still circumstances in which your speakers can be blown. These include overpowering them (using power amps that have a greater power output than the speakers can handle), driving them with amps that are allowed to overload (clip) frequently, and/or setting the LIMITER THRESHOLD too high. When the LIMITER THRESHOLD control is turned up fully clockwise (to +20), there is no limiting at all. The *lower* the setting, the *more* limiting you get. The exact setting you should use depends on many factors, such as the power ratings of your speakers and power amps, the volume control settings on the power amps, and the level and bass content of the original program. As a rough rule of thumb, set it to the point where the LIMITER THRESHOLD light flashes occasionally but not continuously. Use your ears as a guide.

MAIN SPEAKERS HIGH PASS Control: This is another control whose function is speaker protection. It lets you control the bass reaching your main stereo speakers by *frequency* (in contrast, the limiter controls bass by *level*). It allows you to cut the bass off at any frequency from 15 Hz (full range) up to 135 Hz. The correct setting depends on the capabilities of your speakers. Set it no lower than the lowest frequency your stereo speakers can reproduce. If you are using a subwoofer, the MAIN SPEAKERS HIGH PASS control has no effect on the frequency content of the SUBWOOFER OUTPUT. This control is non-functional when the PUNCH-10 is in BYPASS mode, so your main speakers will receive a full range signal when you bypass the PUNCH-10.

Limited Warranty

The Furman PUNCH-10 is warranted against failures due to defective parts or faulty workmanship for a period of one year after delivery to the original owner. During this period, Furman will make any necessary repairs without charge for parts or labor. Shipping charges to the factory or repair station must be prepaid by the owner; return shipping charges (via UPS Ground) will be paid by Furman.

This warranty applies only to the original owner and is not transferable. Also, it does not apply to repairs done other than by the Furman factory or Authorized Repair Stations.

This warranty shall be cancelable by Furman at its sole discretion if the PUNCH-10 unit has been subjected to physical abuse or has been modified in any way without written authorization from Furman. Furman's liability under this warranty is limited to repair or replacement of the defective unit.

Furman will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date (if a Warranty Registration Card was mailed in at the time of purchase, this is not necessary). Before returning any equipment for repair, please read the important information on service, which follows.

Service

Before returning any equipment for repair, please be sure that it is adequately packed and cushioned against damage in shipment, and that it is insured. We suggest that you save the original packaging and use it to ship the product for servicing. Also, please enclose a note giving your name, address, phone number and a description of the problem.

NOTE: All equipment being returned for repair must have a Return Authorization (R/A) Number. To get an R/A Number, please call the Furman Service Department, (415) 927-1225, between 8 am and 5 pm U.S. Pacific Time. Please display your R/A Number prominently on the front of all packages.

PUNCH-10 SPECIFICATIONS

INPUTS	Standard:	Stereo. Input Impedance: 10K ohms. Maximum input level: +15 dBu. Gain: Depends on Subharmonic setting; unity when Subharmonic is set to 0. Connectors: 1/4" phone.
	Balanced (PUNCH-10B):	Stereo. Differential Input Impedance: 20K ohms. Maximum input level: +15 dBu. Gain: Depends on Subharmonic setting; unity when Subharmonic is set to 0. Connectors: Both 1/4" phone and XLR.
OUTPUTS	Standard:	Stereo main and mono subwoofer: Output Impedance: 100 ohms. Maximum output level: +21 dBu. Recommended minimum terminating load: 2.5K ohms. Connectors: 1/4" phone.
	Balanced (PUNCH-10B):	Stereo main and mono subwoofer: Differential Output Impedance: 200 ohms. Maximum output level: +27 dBu. Recommended minimum terminating load: 5K ohms. Connectors: Both 1/4" phone and XLR.
GENERAL	Frequency Response:	-0.5, +1.0 dB from 20 Hz to 20 KHz.
	Output Noise:	-94 dBu with Subharmonic control at minimum, -84 dBu with Subharmonic control at maximum, from 20 Hz to 20 KHz, with input shorted.
	Limiter:	Attack: 8 ms; Release: 1 sec.; Threshold: -20 dBu to +20 dBu, adjustable.
	Main Speakers High Pass:	15 Hz to 135 Hz, adjustable; rolls off at 12 dB/octave.
	Mechanical:	Dimensions: 1.75" H x 19" W x 8" D. Weight: 6 lbs (2.7 kg). Construction: Steel chassis, zinc chromate plating; 1/8" thick brushed and black anodized aluminum front panel; FR4 glass epoxy printed circuit boards; all IC's in sockets.
	Power Requirement:	5 Watts; 120 VAC 60 Hz, or 230 VAC 50/60 Hz versions available.
NOTES		0 dBu equals .775 Vrms. Outputs can be connected to less than the indicated minimum load without damage or excessive distortion, but maximum output levels will be reduced.